

Datum för tentamen	2010-06-08
Sal (3) Om tentan går i flera salar ska du bifoga ett försättsblad till varje sal och <u>ringa in</u> vilken sal som avses	U11 U7 U10
Tid	8-12
Kurskod	TDDD25
Provkod	TEN1
Kursnamn/benämning Provnamn/benämning	Distribuerade system Skriftlig tentamen
Institution	IDA
Antal uppgifter som ingår i tentamen	14
Jour/Kursansvarig Ange vem som besöker salen	Petru Eles
Telefon under skrivtiden	281396, 0708681396
Besöker salen ca kl.	9:30
Kursadministratör/kontaktperson (namn + tfnr + mailaddress)	Gunilla Mellheden, gunilla.mellheden@liu.se, 282297
Tillåtna hjälpmedel	Ordbok
Övrigt	
Vilken typ av papper ska användas, rutigt eller linjerat	
Antal exemplar i påsen	

LINKÖPINGS TEKNISKA HÖGSKOLA

Institutionen för datavetenskap

Petru Eles

Tentamen i kursen

Distribuerade System- TDDD25/TDDB37

2010-06-08, kl. 8-12

Hjälpmedel:

Engelsk ordbok.

Supporting material:

English dictionary.

Poänggränser:

Maximal poäng är 40.

För godkänt krävs sammanlagt

21 poäng.

Points:

Maximum points: 40.

In order to pass the exam you need a total of minimum 21 points.

Jourhavande lärare:

Petru Eles, tel. 281396, 0703681396

Good luck !!!

Tentamen i kursen Distribuerade System -TDDD25/TDDB37, 2010-06-08, kl. 8-12
Du kan skriva på svenska eller engelska!

1. What means transparency in a distributed system? We have defined seven aspects of transparency. Enumerate and explain at least five of them.

(3p)

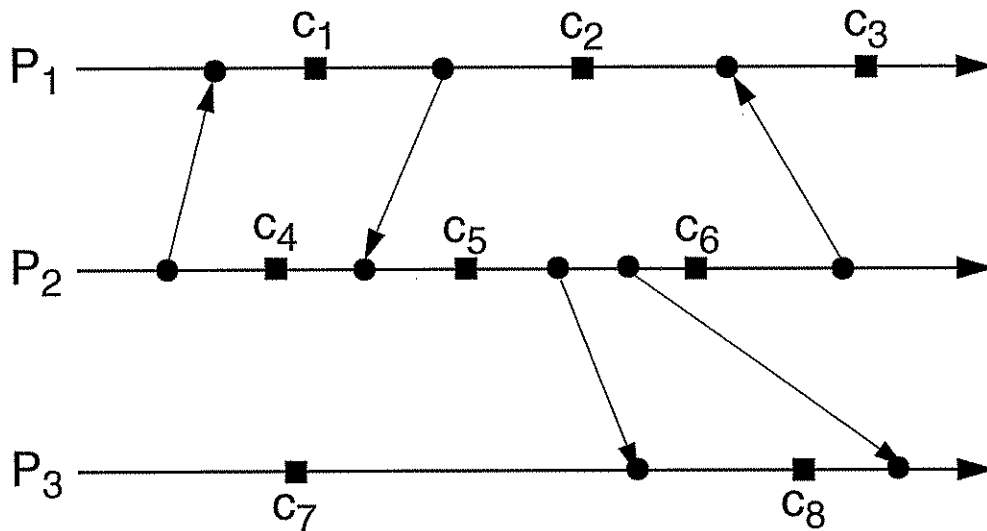
2. Static and dynamic invocation in CORBA:
How do they work? Compare.

(3p)

3. Remote Method Invocation: trace the way of a request and of the reply from the client to a remote server and back. Illustrate with a figure.

(3p)

4. What is a cut of a distributed computation? What means a consistent and a strongly consistent cut? Consider the following set of events:



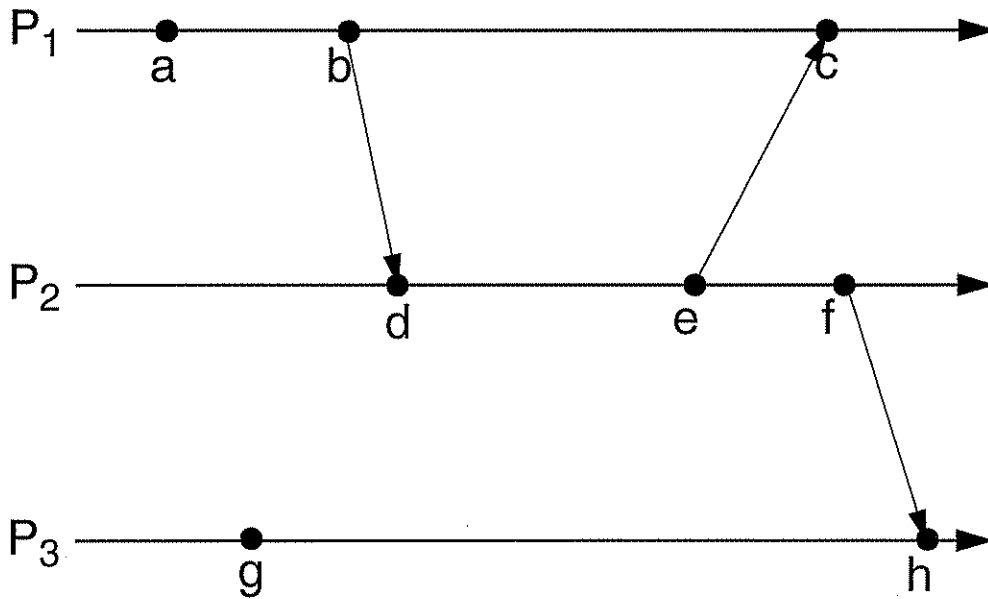
Determine for each of the following cuts if it inconsistent, consistent or strongly consistent:
 {c₂, c₆, c₈}, {c₁, c₄, c₇}, {c₁, c₅, c₇}, {c₁, c₆, c₈}, {c₁, c₆, c₇}, {c₃, c₆, c₈}, {c₂, c₅, c₈}.

(3p)

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5. Define the *happened before* relation (Lamport).

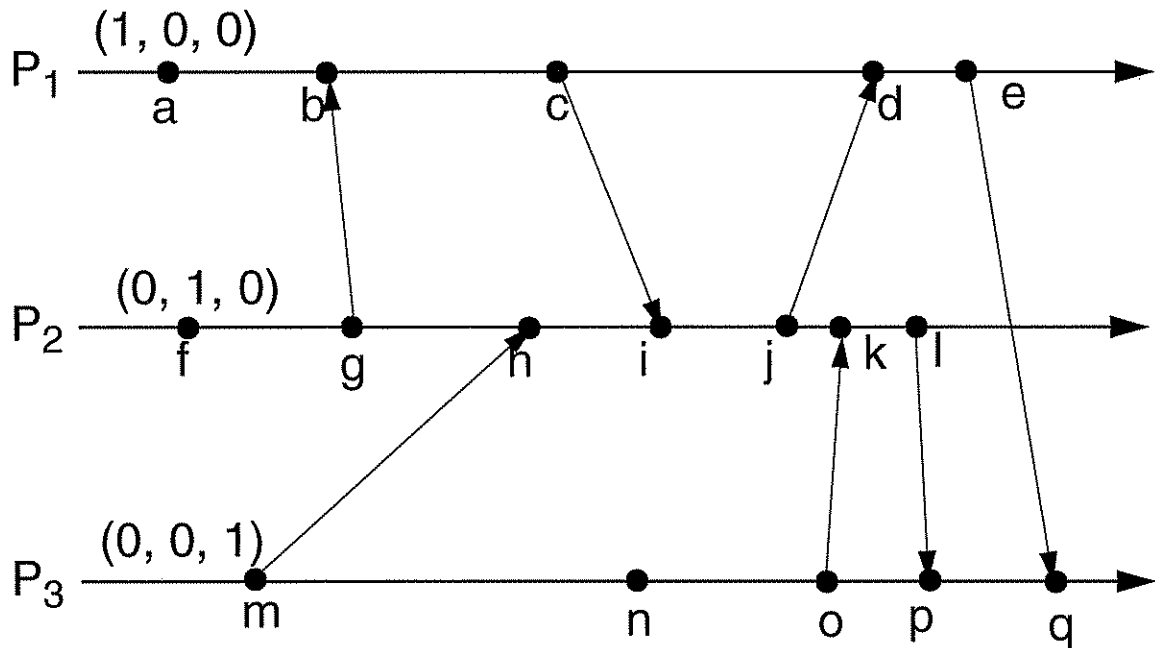
When are two events concurrent?



What is the relation between events a - b, a - d, b - g, g - e, d - c, b - c, a - g, f - g, e - h, a - h?

(3p)

6. Consider the following set of events:



Assign the missing vector clock values to the events.

(3p)

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7. Consider mutual exclusion with the Ricart-Agrawala algorithm (the first algorithm, not using a token). Imagine three processes: P_0 , P_1 , and P_2 . P_1 and P_2 are requesting the same resource, and the timestamp of the requests is (6, 1) and (5, 2) respectively. Illustrate the sequence of messages exchanged (use figures). Who gets the resource first?

(3p)

8. What is the basic idea behind the token based distributed mutual exclusion algorithm by Ricart-Agrawala (the second algorithm)? Consider how mutual exclusion is guaranteed and how the token is passed after a process has left the critical section. How many messages are passed in order a process to get permission to a critical section? Compare to the first algorithm by Ricart-Agrawala (which is not using a token).

(3p)

- 9.
- Define total and causal ordering of requests. Illustrate by an example.
 - How can total ordering be implemented using a central sequencer?
 - Consider total ordering based on distributed agreement (no central sequencer); consider one front end and several replica managers.
In this case, the replica managers, after receiving a request, send back to the front end a *cuid*. What does the front end send back to the replica managers after receiving the *cuid* from each replica manager? How does the front end calculate the value it sends back?
 - What happens if a replica manager crashes before sending to the front end the *cuid* for a request it received?

(4p)

10. Consider a bully election with 6 processes, P_1, \dots, P_6 . P_6 , the current coordinator, fails and P_3 starts the election. Illustrate the sequence of messages exchanged (use figures).

(3p)

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11. The Byzantine Generals Problem: show how agreement is not or is possible for three and for four generals respectively, in the case one of the generals (not the commander) is a traitor (illustrate the exchange of messages with figures).
(3p)

12. Compare the Ethernet protocol and the CAN protocol from the point of view of predictability. Explain.
(2p)

13. You know the maximum drift rate of the clocks on two processors and the maximal allowed skew between them. How do you determine the maximum interval between two successive synchronizations between the clocks?
(2p)

14. What does it mean by external and internal synchronization of physical clocks?
What does it mean by centralised and distributed synchronisation algorithms?
(2p)